

CAPACITIVE TOUCH SENSOR CIRCUIT, METHOD OF FORMING CIRCUIT, AND TOUCH SCREEN AND MOBILE DEVICE COMPRISING THE SAME

FIELD OF THE INVENTION

[0001] Embodiments of the present disclosure relate to a touch screen and specifically to a capacitive touch sensor circuit for a touch screen, a method of forming the circuit and a touch screen and a mobile device comprising the same.

BACKGROUND OF THE INVENTION

[0002] Capacitive touch screens, as a typical representative of touch screens, have been used in different kinds of devices. When a touch screen assembles with a display, it may form some parasitic capacitance between touch sensors consisting the touch screen and display driver sensors consisting the display screen. The display driving signal can feed through this capacitance coupling to touch screen sensor which is a noise for touch screen. When the touch screen gets closer to the display, the parasitic capacitance between the touch screen and display become larger. So does the noise.

[0003] A trend of the touch screen is to be thinner and thinner. However, as a cost, the touch screen is facing the increasing noise from a display screen such as LCD due to the reasons described above. Full lamination and On-Cell solution are examples in which the distance between a touch screen and a display is so small that the noise coupling is increased.

[0004] Conventional solutions for decreasing the noise are adding shelling layers between the touch screen and the display, which, however, disadvantageously increases the thickness of the screen. Therefore, a challenge in the field is how to decrease noise between a touch screen and a display without increasing the thickness of the touch screen.

SUMMARY OF THE INVENTION

[0005] In order to address the foregoing and other potential problems, embodiments of the present disclosure propose a capacitive touch sensor circuit for a touch screen, a method for forming the circuit, and a touch screen and a mobile device comprising the circuit.

[0006] According to a first aspect, embodiments of the present disclosure provide a capacitive touch sensor circuit for a touch screen comprising a plurality of driving elements arranged as multiple rows in parallel with a horizontal axis of the touch screen, wherein the plurality of driving elements are connected into a plurality of driving lines; and a plurality of sensing elements arranged as multiple columns in parallel with a vertical axis of the touch screen, wherein the plurality of sensing elements are connected into a plurality of sensing lines, each of the plurality of sensing elements being paired with a respective one of the plurality of driving elements. The driving lines and the sensing lines are configured as at least one of: at least two driving elements of one of the plurality of driving lines being positioned at different rows; and at least two sensing elements of one of the plurality of sensing lines being positioned at different columns.

[0007] According to a second aspect, embodiments of the present invention provide method of forming a capacitive touch sensor circuit for a touch screen. The method comprises arranging a plurality of driving elements as multiple

rows in parallel with a horizontal axis of the touch screen, wherein the plurality of driving elements are connected into a plurality of driving lines; and arranging a plurality of sensing elements as multiple columns in parallel with a vertical axis of the touch screen, wherein the plurality of sensing elements are connected into a plurality of sensing lines. The driving lines and the sensing lines are configured as at least one of: at least two driving elements of one of the plurality of driving lines being positioned at different rows; and at least two sensing elements of one of the plurality of sensing lines being positioned at different columns.

[0008] According to a third aspect, embodiments of the present invention provide a touch screen comprising a capacitive touch sensor circuit described above.

[0009] According to a fourth aspect, embodiments of the present invention provide a mobile device comprising a capacitive touch sensor circuit described above.

[0010] These and other optional embodiments of the present invention can be implemented to realize one or more of the following advantages. In accordance with some embodiments of the present disclosure, the noise between a touch screen and a display can be decreased without increasing the thickness of the screen.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Through the more detailed description of some preferred embodiments of the present disclosure in the accompanying drawings, the above and other objects, features and advantages of the present disclosure will become more apparent, wherein the same reference numerals generally refer to the same components in the embodiments of the present disclosure.

[0012] FIG. 1 schematically illustrates a traditional assembly of a touch screen and a display;

[0013] FIG. 2 schematically illustrates a traditional arrangement of a capacitive touch sensor circuit for a touch screen;

[0014] FIG. 3 schematically illustrates an arrangement of sensor cells of a capacitive touch sensor circuit according to an embodiment of the present disclosure;

[0015] FIG. 4 schematically illustrates another arrangement of sensor cells of a capacitive touch sensor circuit according to an embodiment of the present disclosure;

[0016] FIG. 5 schematically illustrates an arrangement of sensor cells of a capacitive touch sensor circuit according to a further embodiment of the present disclosure;

[0017] FIG. 6 schematically illustrates an arrangement of sensor cells of a capacitive touch sensor circuit according to yet a further embodiment of the present disclosure;

[0018] FIG. 7 schematically illustrates a block diagram of a mobile device 700 using the capacitive touch sensor circuit according to various embodiments of the present disclosure.

DETAILED DESCRIPTION OF EMBODIMENTS

[0019] Some preferred embodiments will be described in more detail with reference to the accompanying drawings, in which the preferred embodiments of the present disclosure have been illustrated. However, the present disclosure can be implemented in various manners, and thus should not be construed to be limited to the embodiments disclosed herein. On the contrary, those embodiments are provided for thorough and complete understanding of the present disclosure,